

millions sterling. From 1885 to 1902, during the period the writer occupied the position of Director of Naval Construction and Assistant Controller of the Navy, the total outlay on the 245 ships for the designs of which he was responsible amounted to about 100 millions sterling. The stress of foreign competition and the growth in dimensions and cost of warships is leading to still greater expenditure on the Navy, and it is good to know that Canada, Australia, New Zealand, and South Africa are ready and willing to bear their share of the inevitable burden.

All branches of engineering have been and will be drawn upon freely in the execution of this great task. Mining and metallurgy assist by the production of materials of construction; mechanical and electrical engineers contribute machines and appliances required in shipyards and engine factories, as well as guns, gun-mountings, and mechanical apparatus of all kinds required in modern warships in order to supplement and economise manual power; marine engineers design and construct the propelling apparatus, and constantly endeavour to reduce the proportion of weight and space to power developed; naval architects design and build the ships; constructional engineers are occupied in the provision of docks, harbours, and bases adapted to the requirements of the fleet; and other branches of engineering play important, if less prominent, parts. The progress of invention and discovery is increasing, rapid changes occur unceasingly, the outlay is enormous, the task is never ending, but its performance is essential to the continued well-being of the Empire, and it must and will be performed.

#### NOTES.

THE International Geodetic Association will meet in London on September 21 and following days at the rooms of the Institution of Civil Engineers, Great George Street, Westminster. The permanent commission of the association, consisting of one representative from each contributing country, is constituted as follows:—Belgium, Lieut.-Colonel Gillis; Chile, M. Bertrand; Denmark, Major-General Madsen; France, General Bassot (president); Germany, Prof. Foerster; Great Britain, Sir George Darwin (vice-president); Holland, Prof. H. G. van de Sande Bakhuyzen (perpetual secretary); Hungary, Prof. L. de Bodola von Zagon; Italy, Prof. Celoria; Japan, Dr. Hisashi Terao; Mexico, Sen. Angel Anguiano; Norway, Major-General Per Nissen; Portugal, General the Marquis d'Avila et de Bolama; Russia, General Artomonoff; Spain, Sen. Arrillaga; Sweden, Prof. Rosen; Switzerland, Prof. Gautier; United States, Mr. Tittmann. The Argentine Republic will be represented by Prof. Porro de Somenzi, Roumania by Colonel Rimniceano, India by Colonel Burrard, Egypt by Mr. Keeling, Australia by Mr. G. H. Knibbs. Among the seventy or eighty delegates, other than members of the permanent commission, are Prof. Helmert, chief of the Central Bureau, Potsdam, Prof. Albrecht and Prof. von Seeliger (Germany); Vice-Admiral Ritter v. Kalmar and Major-General von Sternneck (Austria), Lieut-Colonel Bourgeois and M. H. Poincaré (France), Baron Roland Eötvös (Hungary), Prof. Kapteyn (Holland), and Dr. Backlund (Russia). Among the representatives of Great Britain are the Astronomer Royal, Colonel Close, Major Leonard Darwin, Rear-Admiral Field, Sir Archibald Geikie, Sir David Gill, Dr. Glazebrook, Colonel Grant, Major Hills, Captain Lyons, and Colonel Sir William Morris. By command of the King, the delegates are invited to visit Windsor Castle on Saturday, September 25. On Monday, September 27, the meeting will be transferred to Cambridge, where the concluding sessions will be held.

THE seventeenth annual exhibition of the Photographic Salon is now open at the Gallery of the Royal Society of Painters in Water Colours, 5A Pall Mall East. As the

promoters of this exhibition are interested only in pictorial work, the technician expects to find among the works they have selected for presentation expressions of the most recent ideas as to approved methods, and the finest examples that these methods can furnish. Last year's Photographic Salon included a large number of colour photographs on autochrome plates, but this year there is not a single colour photograph of any kind. This must mean that, in spite of the improvements in the manufacture and in the methods of using plates for colour photography, the results obtained are not generally satisfactory from the artistic point of view. The shortcomings of these plates are well known and appreciated by those who have studied them, but they do offer possibilities of a certain measure of success in the rendering of colour, and we were not prepared for their total exclusion. The one hundred and thirteen pictures hung, selected, presumably, from many hundreds submitted, include examples of many styles and all degrees of merit. They range from a fuzziness that leaves the subject hardly recognisable to the keenest sharpness of definition, from the darkest to the lightest possible, and from those that have large flat patches of an even tint to those that show the most delicate and perfect modelling that can be desired. It is the possibilities of these great varieties of style that are of technical interest. The catalogue is defective in not giving the methods by which the various examples are produced, but we believe that we are correct in saying that the portraits by Mr. E. O. Hoppe are all unsophisticated platinum prints. These, and some of Mr. Frederick H. Evans's exhibits, and the portrait by Mr. Furley Lewis, will be specially instructive to those who print in platinum as showing the rich results obtainable by this method. In addition to the new work, there are nearly thirty examples of photographs by the late David Octavius Hill, made more than sixty years ago. These demonstrate that the vast strides photography has made during the last half-century have tended rather to increase the output and multiply diversity of method than to raise the quality of the work from a pictorial point of view.

By the death of Mr. Thomas Southwell, which took place at his residence in Norwich on September 5, science has lost an amateur naturalist of the very best type, and one who, by the extremely careful and painstaking nature of his work, set an example even to his professional brethren. Moreover, his natural-history studies were not undertaken for the purpose of filling up the time of an idle man, for during the best years of his life Mr. Southwell was in the employ of Gurney's (Barclay's) bank at Norwich, and could study his favourite subject only in the intervals of his professional work. In addition to possessing a great knowledge of the ornithology of his county, Mr. Southwell devoted special attention to whales and whaling, and for a long series of years his annual report in the *Zoologist* on the product of the season's whaling and sealing expedition afforded a mine of valuable information which could be obtained nowhere else. The great value of these reports consists in the fact that the information relating to the British portion of these industries was always at first hand, Mr. Southwell having got in touch with the whaling captains of Peterhead and Dundee. In addition to giving statistics concerning the annual catch of whales and seals, Mr. Southwell studied and collated all the information he could acquire concerning the distribution and migrations of the Greenland right-whale, and was thus enabled to formulate certain important theories on these points. In 1881 he published a small volume on the "Seals and Whales of the British Seas"; and his

other writings include the third volume of Stevenson's "Birds of Norfolk," a revised second edition (1890) of Lubbock's "Fauna of Norfolk," Sir Thomas Browne's "Notes and Letters on the Natural History of Norfolk," a "Guide to Norwich Castle Museum," and a paper on the former breeding of the crane in East Anglia. At the time of his death Mr. Southwell was in his seventy-ninth year.

M. SANTOS-DUMONT has accomplished several successful flights with an *aéroplane* having a supporting surface of only nine square metres. On September 13 he travelled a cross-country distance of about five miles in five minutes upon this machine.

*Science* announces that the President of the United States has issued a proclamation setting aside the Oregon caves in the Siskiyou National Forest, in the State of Oregon as a national monument. The area of the reservation is about 480 acres.

THE Paris correspondent of the *Times* announces that the fourth International Aeronautical Congress will be held at Nancy on September 18-23. Major Renard (France) will read a paper on the units of *aéronautics* and their nomenclature, and will submit a report on the results and lessons of the recent aviation week at Rheims.

MR. F. C. CONSTABLE, Wick Court, near Bristol, sends notes of observations of a remarkable pink glow observed in the direction of the sun between 6.40 p.m. and 6.58 p.m. on September 12. The pink colour seemed to be the same as that observed by him on a steamer journeying from Bombay to Karachi in 1883, a few days after the Krakatoa eruption.

PROF. SILVANUS P. THOMPSON, F.R.S., has consented to become the first president of the Illuminating Engineering Society, and influential support has been received from many distinguished authorities on matters of illumination in this country, on the Continent, and in America. The society will enter upon its opening session in November, and has every reason to hope for a long and prosperous existence. Anyone interested in the objects of the society and desiring to become a member should apply to Mr. L. Gaster, hon. secretary, 32 Victoria Street, London, S.W.

At the autumn meeting of the Institute of Metals, which will be held at Manchester on October 14 and 15, it is expected that the following papers will be presented:—the constitution and properties of the ternary alloys aluminium-copper-tin, J. H. Andrew and C. A. Edwards; the surface appearance of solders, C. O. Bannister and H. J. Tabor; the technical assay of zinc, H. W. Greenwood; notes on the production of pure spelter, J. S. Glen Primrose; some causes of the corrosion of copper and brass, E. L. Rhead; the elastic breakdown of ductile materials, Prof. C. A. Smith; the copper-zinc alloys—a study of volume changes during solidification, Prof. T. Turner and M. T. Murray.

THE Reale Accademia dei Lincei makes the following announcements:—The royal prize for mathematics is divided equally between Profs. Enriques and Levi-Civita, and that for social and economic sciences is similarly divided between Prof. Rodolfo Benini and Dr. G. Mazzarella. From the Santoro foundation the academy has awarded a prize of 10,000 lire to Prof. Quirino Majorana, for his researches on wireless telephony, which have resulted in communication being established up to distances of 300-400 kilometres or more; in addition, minor awards to Prof. Gabbi, for researches on Malta

fever, and Dr. Canovetti, to enable him to continue his experiments on air resistance. From the same benefaction grants have also been made to Profs. Vinassy de Regny and Gortani, for Alpine studies; Prof. Gorini, for investigating diseases of cheese; Prof. Silvestri, noxious insects; Prof. Almagià, study of precipices; the Lombardy commission for seiches on Laghi di Garda and Maggiore; Dr. Abetti, solar physics, in Prof. Hale's observatory. The Carpi prize for experimental physiology is divided between Drs. Baglioni and Lombroso. The late Prof. Sella has bequeathed to the academy a prize of 1000 lire, to be awarded annually to some assistant in an Italian physical laboratory, this being the second gift that the academy has received during the year.

THE seventh annual meeting of the South African Association for the Advancement of Science will be held in Bloemfontein on September 27 to October 2 inclusive, under the presidency of Sir Hamilton Goold-Adams, G.C.M.G. The business of the meeting will be held in three sections as follows:—Section I., astronomy, mathematics, physics, meteorology, geodesy, surveying, engineering, architecture, and geography: president, Prof. W. A. Douglas Rudge, Bloemfontein; Section II., chemistry, bacteriology, geology, botany, mineralogy, zoology, agriculture, forestry, sanitary science: president, Dr. C. F. Juritz, Cape Town; Section III., anthropology, ethnology, education, history, mental science, philology, political economy, sociology, and statistics: president, Mr. Hugh Gunn, Bloemfontein. The second award of the South Africa medal and grant will be made to Dr. Harry Bolus at this meeting. The South African Ornithologists' Union will meet in Bloemfontein at the same time and in the same buildings as the association. A series of lectures, under the auspices of the association, on Darwinism and human life, by Prof. J. Arthur Thomson, is being delivered in South Africa by way of celebrating the Darwin centenary. The honorary general secretaries of the meeting are Dr. J. D. F. Gilchrist, South African College, Cape Town, and Mr. R. T. A. Innes, Government Observatory, Johannesburg.

A LARGE portion of the August number of the *Museums Journal* is taken up by the report of the meeting of the Museums Association held at Maidstone in July. The programme of the meeting included a visit to Ightham to inspect the collection of flint implements brought together by Mr. B. Harrison.

In the September number of Witherby's *British Birds* Mr. P. H. Barr appears to have disposed effectually of the remarkable idea that the black-headed gull acquires the feature to which it owes its name by means of a mysterious colour-change in the feathers of the head. He has proved that a moult takes place early in the year, usually in February, which embraces, not only the head, but the breast and back, and that at the conclusion of the process, which takes about a week, the black skull-cap is acquired. Occasionally young birds assume the black cap of the breeding plumage while they are still in the immature dress elsewhere.

ACCORDING to Bulletin No. 33 of the Biological Survey of the U.S. Department of Agriculture, which is devoted to the brown rat in the States, serious efforts are being made in North America and Japan to reduce the numbers of this rodent, which is regarded as the worst mammalian pest in the world. So far, however, the campaign has not been crowned with success, the annual destruction of from several hundred thousand to a million head in Japan making no appreciable diminution in its numbers. In the



paper before us Mr. D. E. Lantz has given a very full account of the morphology, distribution, migration, and ethology of the rat, with suggestions as to the best means of hunting and trapping, and the elimination of conditions conducive to its rapid increase.

THE Belfast Naturalists' Field Club, the oldest club of the kind in Ireland, has always possessed a strong geological section. An interesting excursion was recently undertaken to the eskers at Drumfane and near Broughshane. The accompanying illustration shows the fine sections that occur in these glacial ridges in co. Antrim. We learn from a report in the *Northern Whig* for August 24 that determinations were made of the source of the material, which proved to be mainly derived from local rocks. The Cainozoic rhyolites of Cloughwater and Ballycloughan were visited later in the day. Rhyolitic lavas are not so limited in the British Isles as the report before us would suggest, since the enormous outpourings in the Snowdon area and in Borrowdale must be borne in mind; but those of Antrim have a thoroughly modern

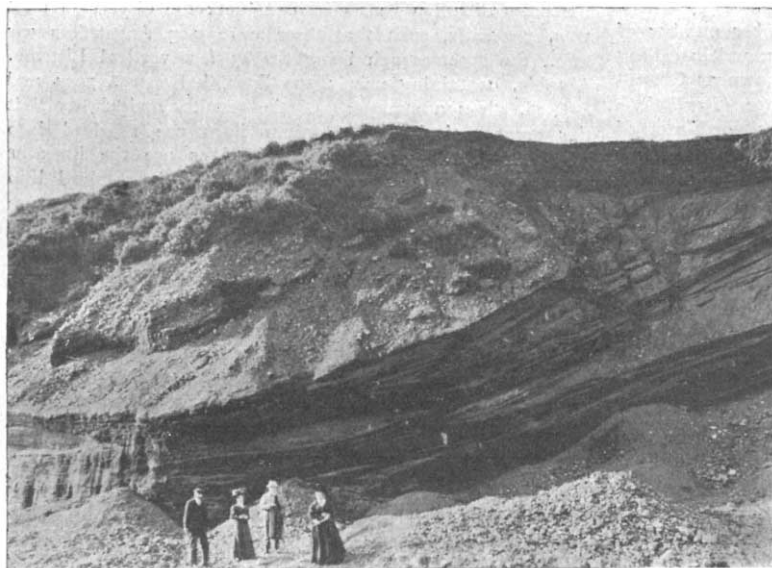
skull to his own satisfaction, Dr. Ameghino concludes that it affords further evidence of his view as to the South American origin of the human race. Additional testimony in favour of this opinion is stated to be afforded by the lower jaw of a child with the angle inflected in marsupial fashion. The extinct South American genus *Microbiotherium* is regarded as the *fons et origo* of most mammals, and from this sprang *Clenialites*, the ancestor of the Primates.

THE *West Australian* newspaper of July 7 contains the report of an address, by Dr. J. B. Cleland, read before the West Australian Natural History Society at its annual meeting held at Perth. The subject was the Australian fauna and flora, and especially the effects produced on these by foreign invaders. After alluding to the rabbit-pest, the author stated that the inexcusable introduction of the fox for sporting purposes has led to its rapid multiplication in parts of Victoria, South Australia, &c., and the loss of many sheep. Cats have become wild, and near Perth, for instance, fierce and powerful in build, feeding on the native birds and smaller animals and rabbits where these are present. The Norway rat and the black rat seem not to have extended beyond man's more immediate surroundings. The dominant rat in Perth is the sociable black rat, the larger Norway rat being hitherto obtained only from the neighbourhood of the wharves at Fremantle and Perth. It is otherwise in Sydney, where both are found together in the town. These rats have brought with them several species of fleas, of which some will bite man when their original host is absent (e.g. has died). By this means plague, introduced by rats, is communicated to man. The sparrow, the starling, the goldfinch, the blackbird, and the Indian minah have all come to stay. Some of these eat much grain and fruit, while all tend to drive away and usurp the place of the beautiful, interesting, and useful native birds.

DR. E. JANCZEWSKI contributes to the *Bulletin international de l'Académie des Sciences de Cracovie* (No. 6)

a short supplement to his monograph on the genus *Ribes*. In the same part Mr. C. Rouppert presents a revision of the discomycetous fungus *Sphærosoma*. This genus, of which a new species was discovered by the author, has been variously classed under the *Pezizaceæ*, *Helvellaceæ*, and *Tuberaceæ*. It is here referred to the *Helvellaceæ*, but is regarded as a connecting link with the other two families.

THE latest issue of the *Kew Bulletin* (No. 7) opens with a review of the known species of *Impatiens* from the Philippine Islands, communicated by Sir J. D. Hooker, which forms a continuation of the extensive survey of the genus, based on collections from India, China, and the Malayan region. Out of twenty-five species, collected chiefly in the neighbourhood of Luzon, only two agree with previously determined species. The author is of opinion that further exploration will lead to the discovery of many more species. In the same number there is published a decade of *Diagnoses Africanæ* (No. xxx.), which includes the type of a new liliaceous genus, *Neodregea*, allied to *Dipidax*.



Gravel Pit, Drumfane, near Ballymena, County Antrim. Photographed by Mr. J. L. S. Jackson.

aspect, and may be compared with types in Hungary or in Mexico. Naturalists in the north of Ireland are fortunate in having established a tradition for good observational work, in which amateurs have played a most important part.

A NICE little question in nomenclature is raised by Dr. Ameghino in a paper published in the *An. Mus. Nat. de Buenos Aires*, vol. xix., pp. 107-209, under the title of "Le *Diprotomo platensis*, un précurseur de l'homme du Pliocène inférieur de Buénos Aires." It appears that in 1884 the author proposed the generic term *Diprotomo* for one of the hypothetical ancestors of *Homo sapiens*. Recently Dr. Ameghino obtained from a superficial stratum in Buenos Aires, regarded as of Lower Pliocene age, a calvarium of apparently low type, which in his opinion is generically distinct from *Homo*. For this supposed new genus he proposes to adopt the name *Diprotomo* with the new affix *platensis*. As having no tangible type, "*Diprotomo*" will probably be regarded as a *nomen nudum*, and if this be so many naturalists will be likely to say that it cannot be employed in a new sense. After restoring the

It will add to the general estimation of the common cruciferous plant, the shepherd's purse, when it is realised that the species can be segregated into several elementary species or biotypes. The latest investigation, undertaken by Mr. G. H. Shull at the Station for Experimental Evolution of the Carnegie Institution of Washington, and described in Publication No. 112 of the institution, bears evidence with regard to the existence of at least four biotypes which breed true under ordinary conditions and can readily be crossed; they are distinguished by characteristic lobings of the leaf. The author has also investigated the type known as *Bursa (Capsella) Heegeri*, which bears round seed capsules; this plant was found in the market-place at Landau, Germany, but has been lost except under cultivation.

BLACK spots varying in size from 1/10-inch to 3/8-inch in diameter are occasionally noticed on chilled beef. Dr. Klein has investigated their nature, and finds them to be caused by the mycelium of a fungus, an oidium, which is quite harmless and does not alter the meat beyond their limits (Report to the Frozen Meat Trade Association).

AN interesting contribution to the September number of *Travel and Exploration* is an account, by a writer calling himself Pousse Caillou, of the region known as Changchenmo, the home of the Tibetan antelope (*Pantholops hodgsoni*) and the *Ovis ammon*, which lies north-east of Leh, on the Kashmir-Turkestan frontier. Here we find seventy or eighty miles of the most utterly forsaken country which can be imagined. The lower volcanic hills, broken into Gothic pinnacles, are backed by a coal-black precipice, featureless and rigid in outline, while the intervening valleys of pure sand are swept by bitterly cold winds. Game preservation is more rigidly enforced even than in Ladakh, only six licences for shooting being granted annually, and the bag of antelope is limited to six specimens. The writer vividly describes the difficulty of shooting this shy animal, the success of the stalk being often interfered with by the appearance of the kyang, half-wild horse or ass, which roams wild on these plateaux.

THE report of the committee on ancient earthworks and fortified enclosures, prepared for presentation to the Congress of Archaeological Societies for the current year, presents no features of startling novelty. Measures for protection of sites have been successful in the cases of Maiden Castle, Dorset; Thetford Castle Meadow and Hill, Norfolk; Stokeleigh Camp, on the Somerset side of the Avon; White Barrow, Wilts; the earthwork at Selsea; the old landmarks of Epping Forest; and Pendina's Camp, Cardiganshire. On the other hand, the committee has to report that in many cases the laying out of golf courses has caused the mutilation of ancient ramparts and ditches. The discovery of a portion of the Roman Wall of London on the site of Christ's Hospital; excavations at Caerwent and Caerleon, Caersws, in Montgomeryshire, and Elslack, near Skipton, in Yorkshire, were the most important operations of the year. The bibliography of current literature on the subject is a useful addition to the report of this committee.

It very rarely happens that three well-developed typhoons occur within the space of ten days; in the Bulletin of the Manila Weather Bureau for October, 1908, Señor Coronas gives an excellent discussion, with charts, of three such cyclonic storms which reached the central and northern parts of Luzon on October 4, 8, and 13, accompanied by photographs of the destruction caused. They all appear to have originated in the vicinity of the Western Caroline

Islands, and to have travelled in a W.N.W. direction; on reaching the archipelago they were considerably modified in shape and extent, and crossed the China Sea in a somewhat more northerly direction. The rates of translation, during which the wind at times reached hurricane force, varied considerably, in one instance attaining the unusual speed of twenty-one miles an hour, but on reaching the China Sea the velocity of translation considerably diminished in all cases. The barometric fall was very rapid, the minimum at one station being 27.99 inches, although it was some fifteen miles from the vortex. Forewarned by valuable observations from Guam (Ladrone Islands) and Yap (Western Caroline Islands), the Manila Observatory was able to give timely notice in each case to its own stations and to foreign services.

SOME interesting results are described and illustrated by Dr. A. S. King in No. 1, vol. xxx., of the *Astrophysical Journal*, where he publishes a paper on the Zeeman effect in the spectrum of titanium. The experiments were carried out at the Mount Wilson Observatory, field strengths of 12,500, 13,800, and 18,400 gauss being employed between the poles of a Du Bois electromagnet; the dispersion used was, generally, such that there were 0.93 Angströms per mm., the spectrograph being the 13 feet vertical Littrow. A table, containing nearly 300 lines, between  $\lambda$  3904 and  $\lambda$  6556, gives a summary of the results, and shows that the great majority of titanium lines are resolved into triplets. Notable among the exceptions are the lines at  $\lambda$  4527.49 and  $\lambda$  4544.86, each of which is resolved into seven components, and shows a regularity of structure identical in both; the line at  $\lambda$  4281.53 has eight components. Two sextets and three quintuplets also show a certain regularity in their separations, which is not shown, however, by the lines having four components. Special attention was paid to the forty-four lines given in Lockyer's list of "enhanced" titanium lines, which do not appear to fall in any special class; thirty-five are triple, six are quadruple, one quintuple, and two sextuple. Two plates, which accompany the paper, beautifully illustrate some of the more interesting separations.

ATTENTION is directed by Mr. G. N. Huntly, in a brief paper in the Journal of the Society of Chemical Industry, to a curious case of corrosion occurring in a stand-by boiler at the generating station of the London Electric Supply Corporation. The corrosion had been noticed two years previously, but attempts to check it by the addition of caustic soda to the boiler-water had proved unavailing. The interior of the boiler showed numerous blisters up to 30 mm. in diameter, most of them near the water-level; each blister contained a clear liquid with a black powder in suspension, and a pit was observed to be forming in the centre of each blister. Analysis showed the presence of ferrous sulphate and free sulphuric acid in the liquid contents, although the boiler fluid was alkaline and contained little sulphur. The action was traced to manganese sulphide in the steel, which had become oxidised with formation of sulphuric acid; as the water in the boiler was quiet, the acid remained trapped behind a film of rust, and acid corrosion could thus take place in an alkaline medium, the oxygen required to convert the sulphur into acid penetrating the blister more readily than the alkali of the water. Addition of sodium arsenite to the boiler-water in place of caustic soda completely stopped the trouble, perhaps by eliminating the dissolved oxygen. These experiments confirm the growing impression that the injurious effects of sulphur in steel cannot be wholly removed by the addition of manganese; so far from being harmless, the manganese sulphide appears to be a



dangerous constituent, leading to fractures as well as to corrosion.

PROF. O. LEHMANN, of Carlsruhe, who is so well known for his work on liquid crystals, has done a great service to those wishing to repeat any of the beautiful experiments which can be performed with these bodies by giving, in the *Physikalische Zeitschrift* for August 15, detailed descriptions of thirty-two of the most convenient and suitable experiments to perform during a lecture on the subject.

THE *Physical Review* for July contains the second of a series of communications from Mr. G. W. Pierce, of the Jefferson Physical Laboratory of Harvard, on the behaviour of rectifiers of alternating electric currents such as are used as detectors of electric waves. In the present case electrolytic rectifiers have been studied by the aid of the Braun tube oscillograph, and the author finds that the theory of electrolytic polarisation is capable of explaining all the facts observed, if the slight polarisation capacity of the small platinum electrode of the rectifier is taken into account. The detector, when polarised by the superposition of a direct current, is almost perfect, that is, the current it produces is nearly all in one direction. It may therefore be compared with the crystal rectifiers dealt with in the author's first paper. The author proposes to examine the behaviour of vacuum-tube rectifiers before giving definite shape to any theory of crystal rectifiers.

THE *Century Magazine* for September contains two interesting engineering articles. The first of these deals with the great aqueduct now being constructed for bringing water from the Catskill Mountains to the City of New York. This aqueduct will be ninety-two miles long, and, to supply the 500,000,000 gallons required daily, more than 600 square miles of collection area must be utilised and several large reservoirs constructed. The article is well illustrated with photographs, sections, and maps. The second article is a first instalment giving an account of Fulton's invention of the steam-boat. While many engineers in this and other countries experimented towards the end of the eighteenth century, Fulton was the first to secure real success. However, it may comfort some of our British patriots to be reminded that the American vessel was fitted with one of Watt's engines, constructed in Birmingham and shipped to America. The article contains many original documents and drawings, and is of interest as showing that the modern troubles which many inventors have to face in working out their schemes and in overcoming red tape had their counterpart more than a century ago.

THE results of some experiments on solid steel bars under combined stress are given in an article in *Engineering* for August 20. The author, Mr. C. A. Smith, of the East London College, University of London, has already presented useful work in confirmation of Guest's law, and in this series has loaded solid specimens in compression and torsion, and also in tension and torsion. The necessity for doing this will be evident when it is remembered that Lord Kelvin suggested that, as a tension load lowers the torsional yield point, a compression load would raise it. Four different grades of steel were experimented on, of carbon content ranging from 0.09 per cent. to 0.48 per cent. Under combined compression and torsion, the maximum principal stress at yielding varied from 19,800 lb. to 36,500 lb. per square inch, while the maximum shear stress varied from 18,900 lb. to 20,400 lb. per square inch, the average variation from the mean of the latter stress being 2.16 per cent. Another series shows an average variation

of the maximum shear stress from the mean of 1.87 per cent. only, this series including tests in tension, compression, torsion, and combined stress. Taking all the results given, the average variation from the mean of the maximum shear stress is about 2 per cent. The importance of these tests will be understood when the difficulties of testing solid specimens under combined stress are remembered, difficulties which seem to have been overcome successfully by use of the author's sphingometer, by means of which the tension and compression measurements are taken in three planes.

REFERRING to the letters published in NATURE of July 22 and 29 in regard to sonorous or musical sands, Prof. J. C. Branner, Stanford University, California, writes to direct attention to articles on this subject by Profs. H. C. Bolton and Alexis A. Julien, published in the Proceedings of the American Association for the Advancement of Science (vol. xxxii., pp. 251-2; vol. xxxiii., pp. 408-13; vol. xxxviii., pp. 137-40). We may remind Prof. Branner that the subject was discussed in NATURE by Prof. Bolton and Mr. Carus-Wilson twenty years ago (vols. xxxix.-xlvi.).

A NEW edition of Mr. P. H. L'Estrange's "Junior Course of Comparative Geography" has been published by Messrs. George Philip and Son, Ltd. Part v. of this book, too, has now been issued separately at the price of 10d. In the new edition all the maps of the original work have been reproduced in black and white, the names and symbols required for this course only being retained. The book has been revised throughout, and additional matter added, for example, on local geography.

#### OUR ASTRONOMICAL COLUMN.

HALLEY'S COMET RE-DISCOVERED.—To Prof. Max Wolf belongs the honour of re-discovering Halley's comet after an absence of more than seventy years. A telegram from the Kiel Centralstelle announces that the comet was discovered at the Königstuhl Observatory on September 11. Its position at 14h. 7.3m. (Königstuhl M.T.) was

R.A. = 6h. 18m. 12s., dec. = +17° 11',

and its magnitude 16.0.

Mr. Crommelin's ephemeris position for September 11.9 was

R.A. = 6h. 18m. 4s., dec. = +17° 16',

so to the Greenwich calculators, Messrs. Cowell and Crommelin, must be given the credit of having prepared an ephemeris which agrees remarkably well with the observation. At present the comet is approaching the northern limit of Orion from the south-western region of Gemini, forming nearly a straight line with the stars  $\gamma$  Geminorum and 143 O $\Sigma$ , the three objects being about equally spaced in the order  $\gamma$ —143 O $\Sigma$ —comet. The following is an extract from Mr. Crommelin's ephemeris:—September 25.7, 6h. 18.5m., +17° 11'; October 9.1, 6h. 14.6m., +17° 8'; October 22.0, 6h. 4.9m., +17° 2'.

OBSERVATIONS OF MARS.—Some interesting observations of changes, during August, in the areas surrounding the southern ice-cap of Mars are reported by MM. Antoniadi, Quéniisset, and Jarry-Desloges in the September number of the *Bulletin de la Société astronomique de France* (pp. 385-94). M. Antoniadi, observing at Juvisy on August 12, 14, and 16, found the planetary features so pale as to be almost unrecognisable. On August 15 the Orontes was suspected to be, and the Euphrates was certainly, double, whilst, later, the Amenthes was seen to be broad and diffuse. M. Antoniadi suggests that the pale greyiness of the darker regions may be due to the interposition of very light clouds or of a mist in the Martian atmosphere. Both MM. Quéniisset and Jarry-Desloges also direct attention to the unusual paleness of the dark regions of the planet during the past few weeks, and each account is illustrated by reproductions from the original drawings showing various aspects of the planet.